NPDG experiment enclosure with a quadratic mesh
Nov 26,2001

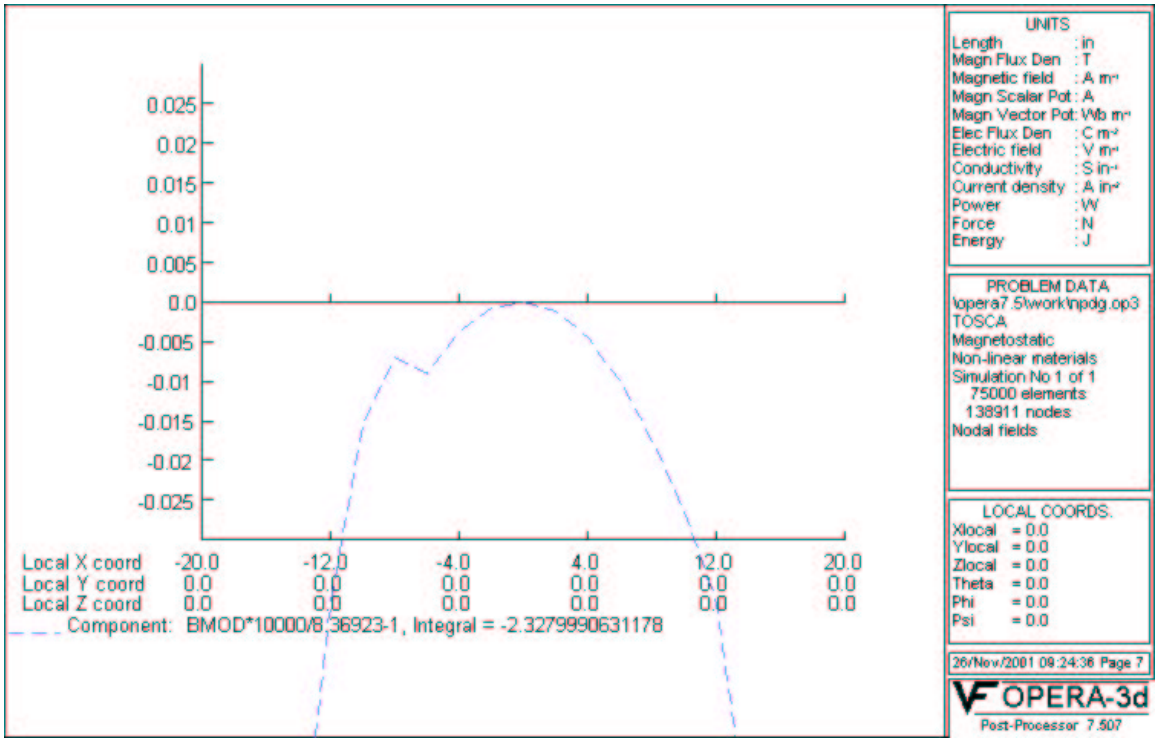
This calculation uses a quadratic mesh for better accuracy.

The model has horizontal mid plane symmetry.
The fields have an imposed perpendicular boundary condition.
The actual NPDG room also has horizontal mid plane symmetry so this is not a bad choice.

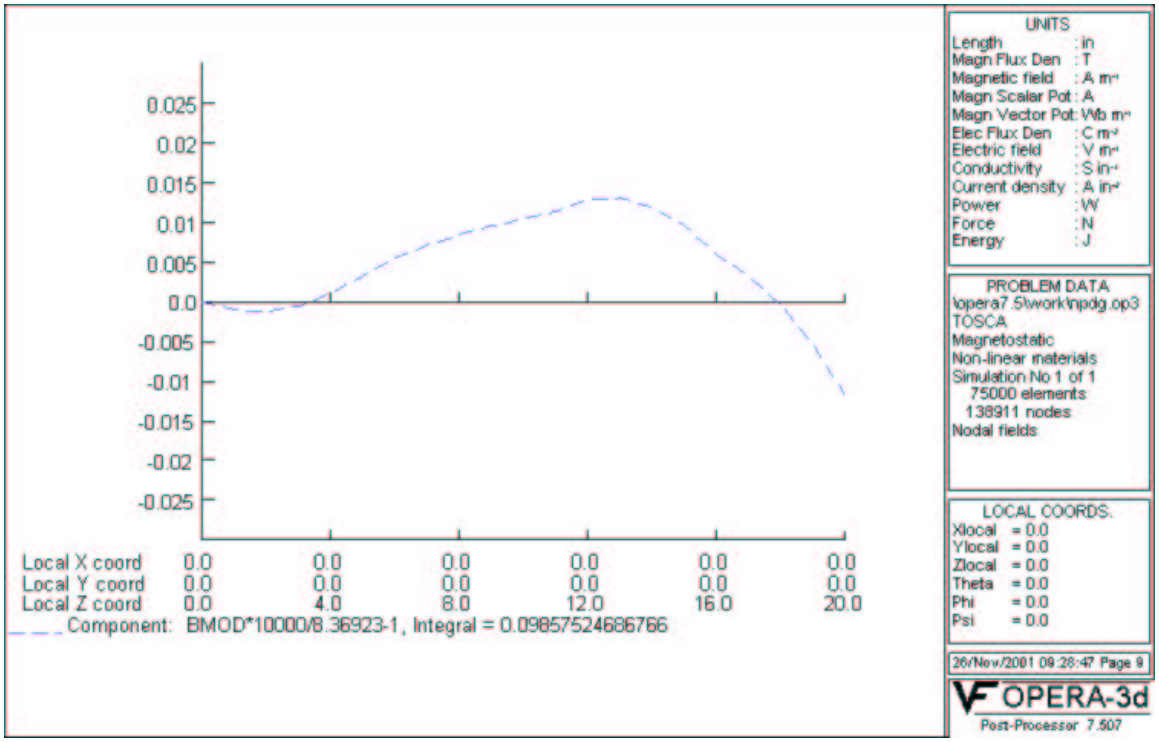
The requirement for B < 0.03 are met in the field volume .
The gradient requirement is not met.

Generally coils of this type cannot cancel multi-poles as well as
A current distribution that approximates a cosine theta distribution.
The coil cross section would be about the same as used for these rectangular coils
Or 2 by 2 inches.

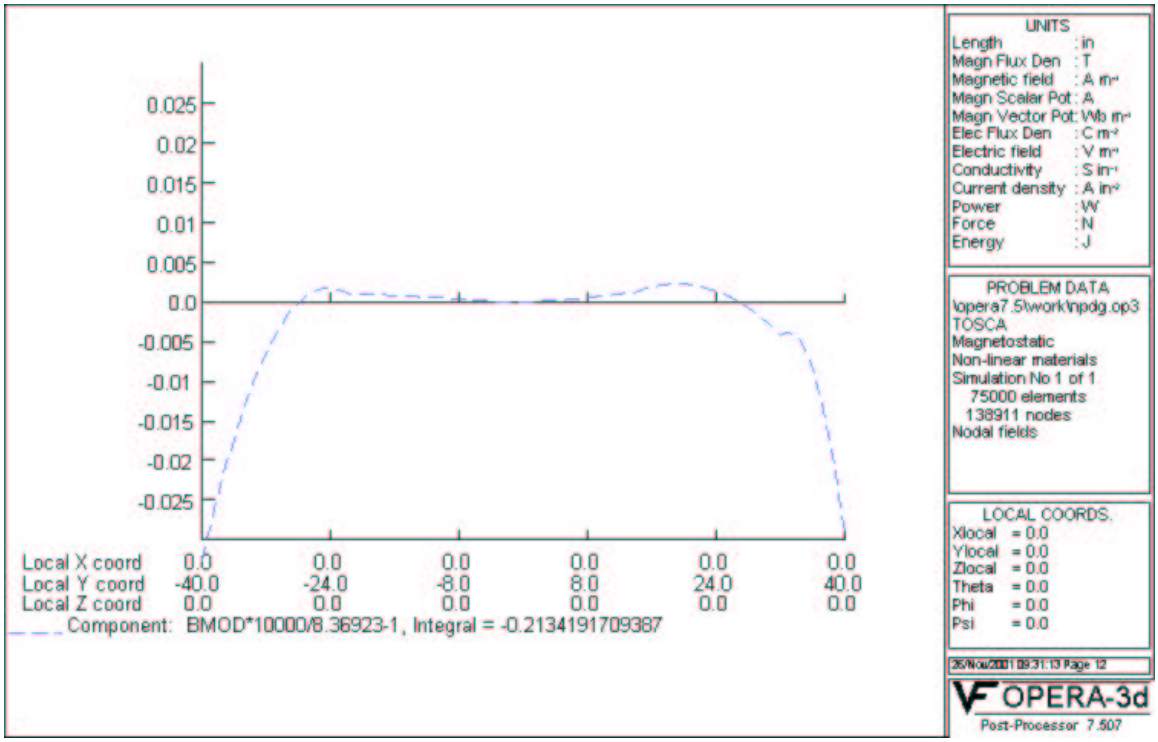
A three coil array on a cylinder of R=24 inches (or bigger) would cancel all multi-poles
Inside a radius of 60 %.
The quad term would cancel out to maybe 80 % of coil radius.



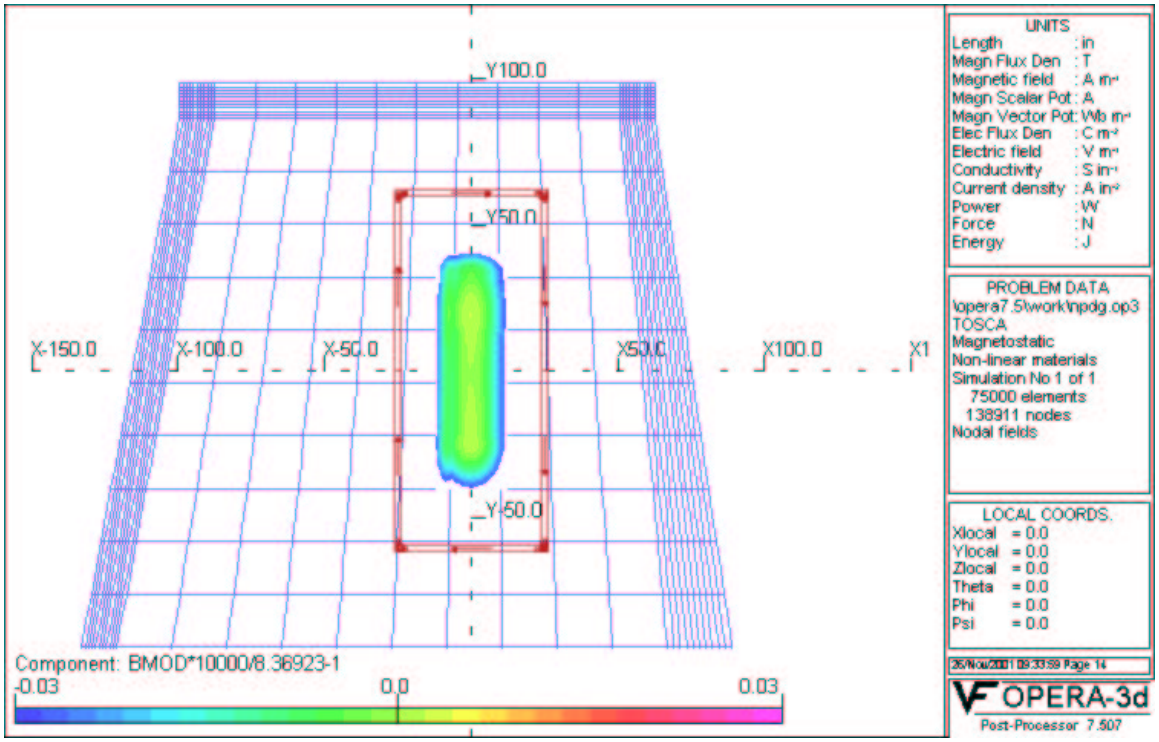
DBz/Bz < 0.03 good field region is —12 inches to +12 inches.

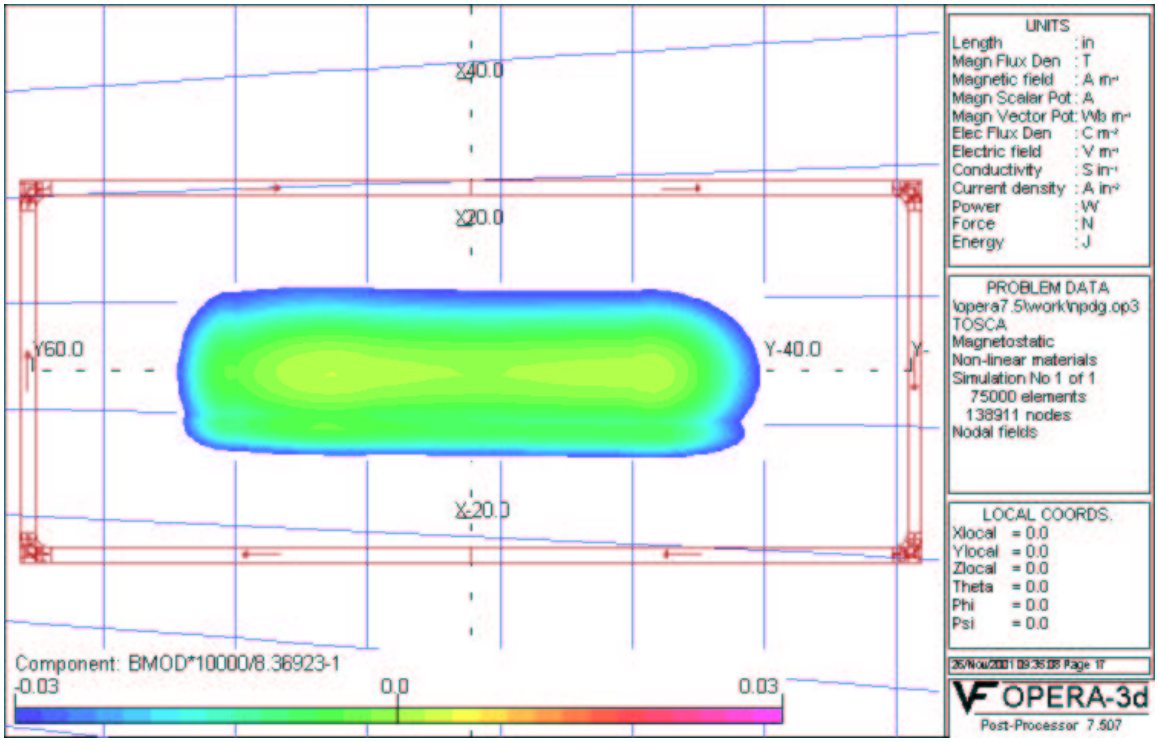


DBMOD/BMOD < 0.03 from 0 <Z<20 inches

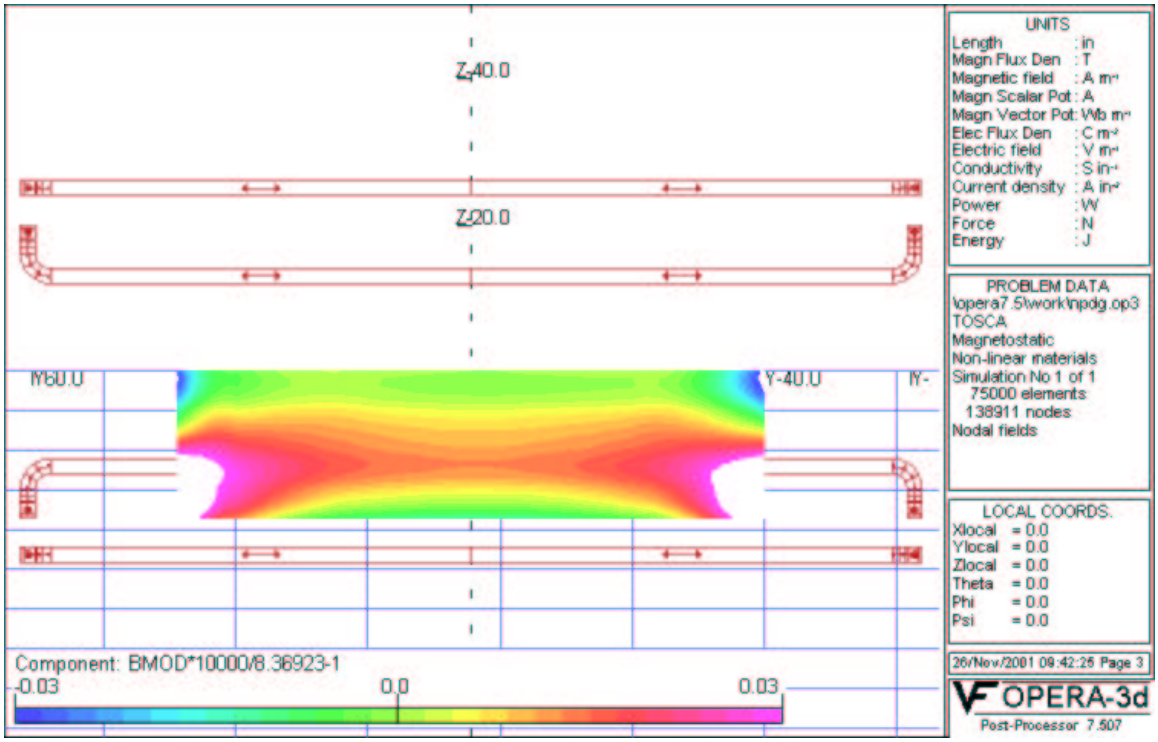


DBMOD / BMOD < 0.03 from —40 < Y < 40

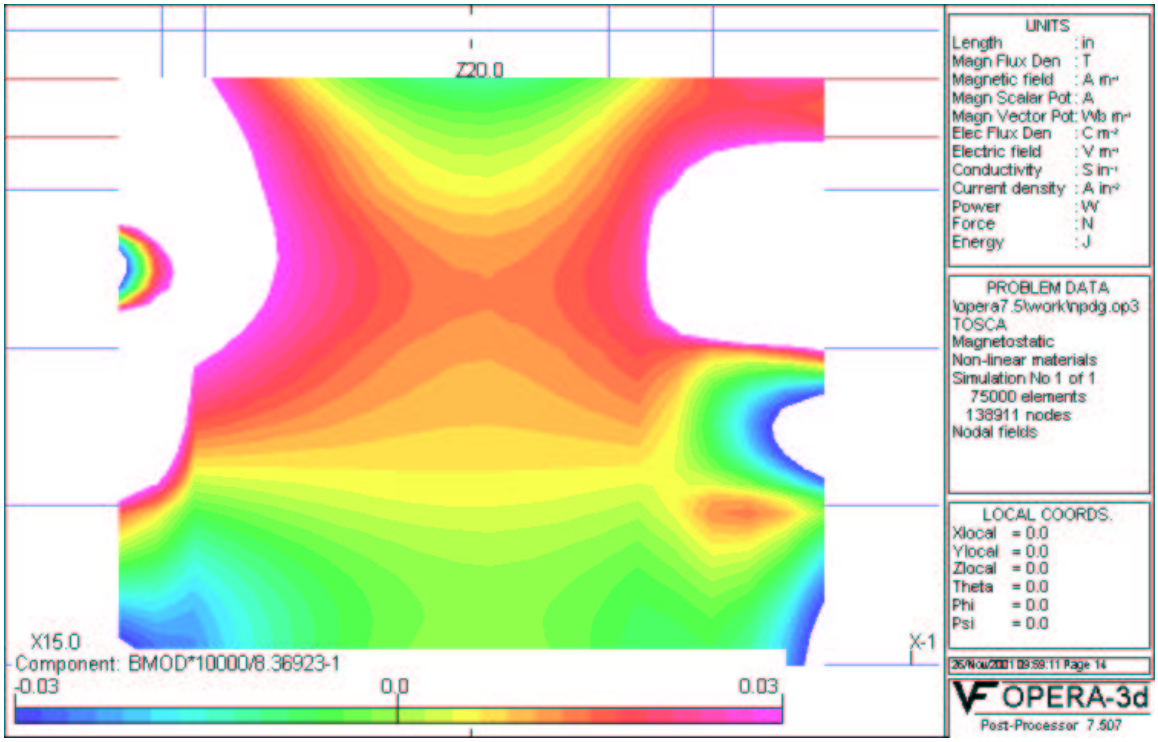

Y100.0
Y50.0
X-150.0
X-100.0
X-50.0
X50.0
X100.0
X1
Y-50.0
Component: BMOD*10000/8.36923-1
-0.03
0.0
0.03
UNITS
Length : in
Magn Flux Den : T
Magnetic field : A m-1
Magn Scalar Pot : A
Magn Vector Pot : Wb m-1
Elec Flux Den : C m-2
Electric field : V m-1
Conductivity : S m-1
Current density : A m-2
Power : W
Force : N
Energy : J
PROBLEM DATA
\opera7.5\work\npdig.op3
TOSCA
Magnetostatic
Non-linear materials
Simulation No 1 of 1
75000 elements
138911 nodes
Nodal fields
LOCAL COORDS.
Xlocal = 0.0
Ylocal = 0.0
Zlocal = 0.0
Theta = 0.0
Phi = 0.0
Psi = 0.0
25/Nov/2001 09:33:59 Page 14
OPERA-3d
Post-Processor 7.507



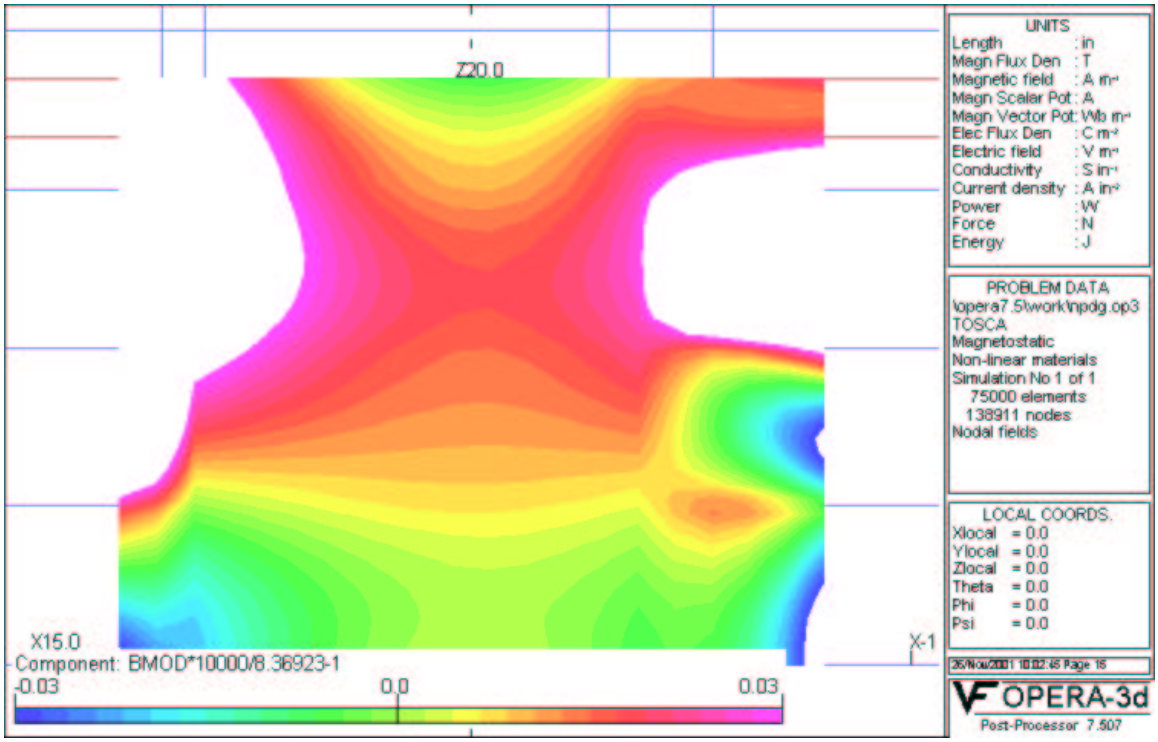
DBMOD/BMOD < 0.03 for —12<X<12 and —40 <Y<40



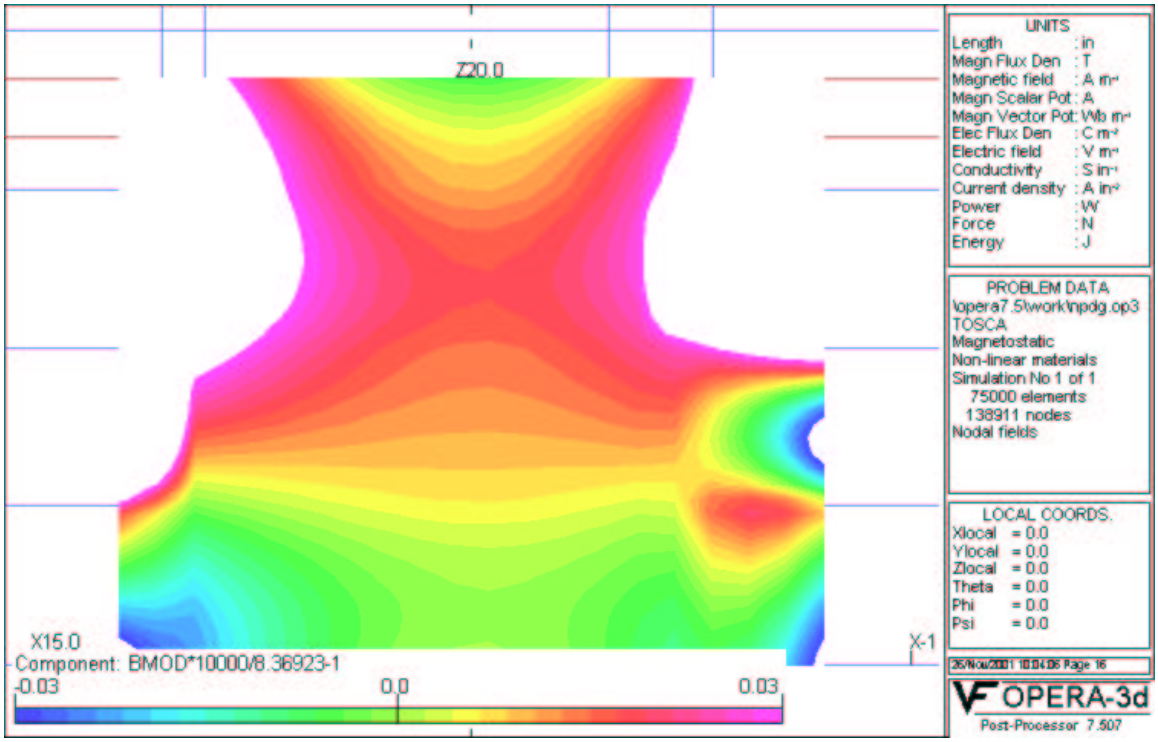
DBMOD/BMOD < 0.03 0<Z<20 , -40 <Y<40



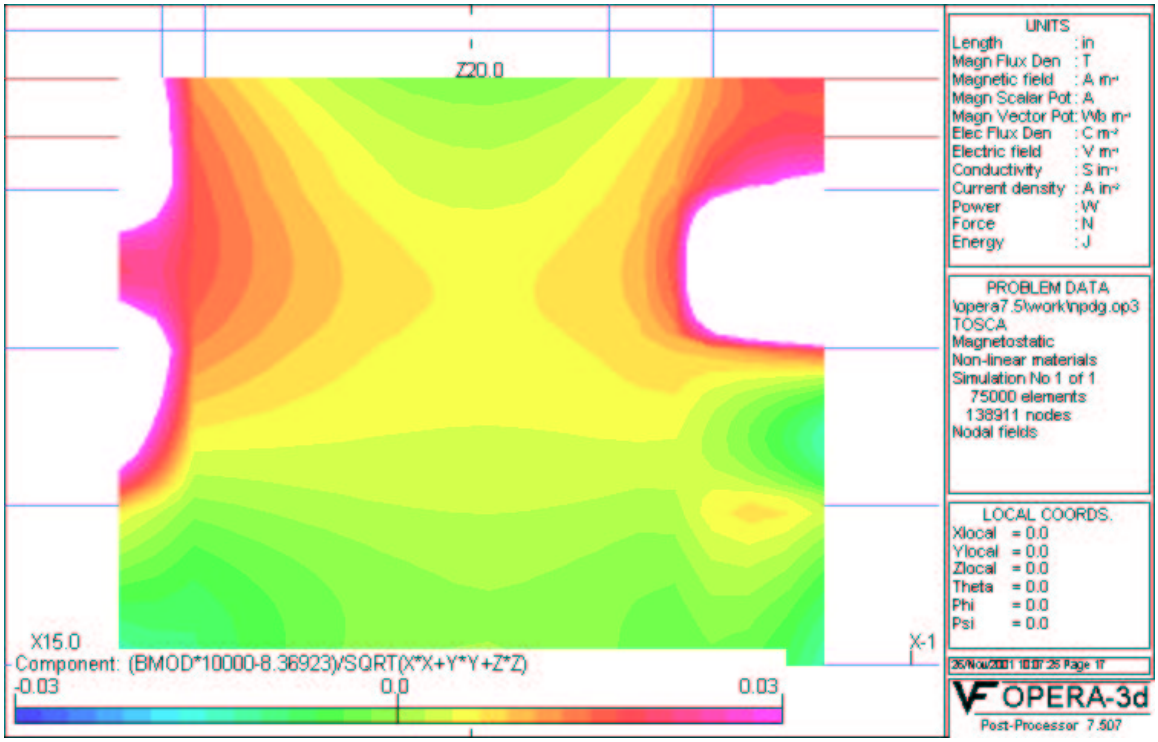
Dbmod/bmod < 0.03 , 0<Z<20 , -12<X<12 , Y=0



DBMOD/BMOD < 0.03 ,0<Z<20 , -12<X<12 , Y=20

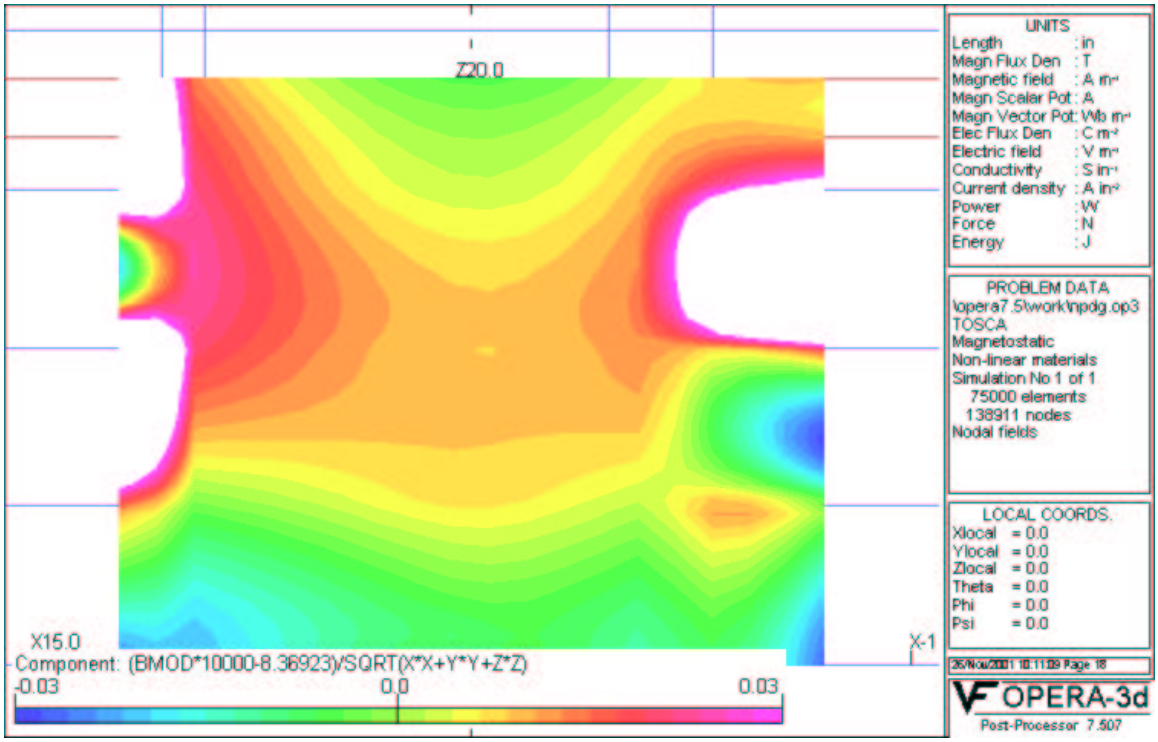


DBMOD<0.03 ,0<Z<20,-12<X<12 ,Y=20

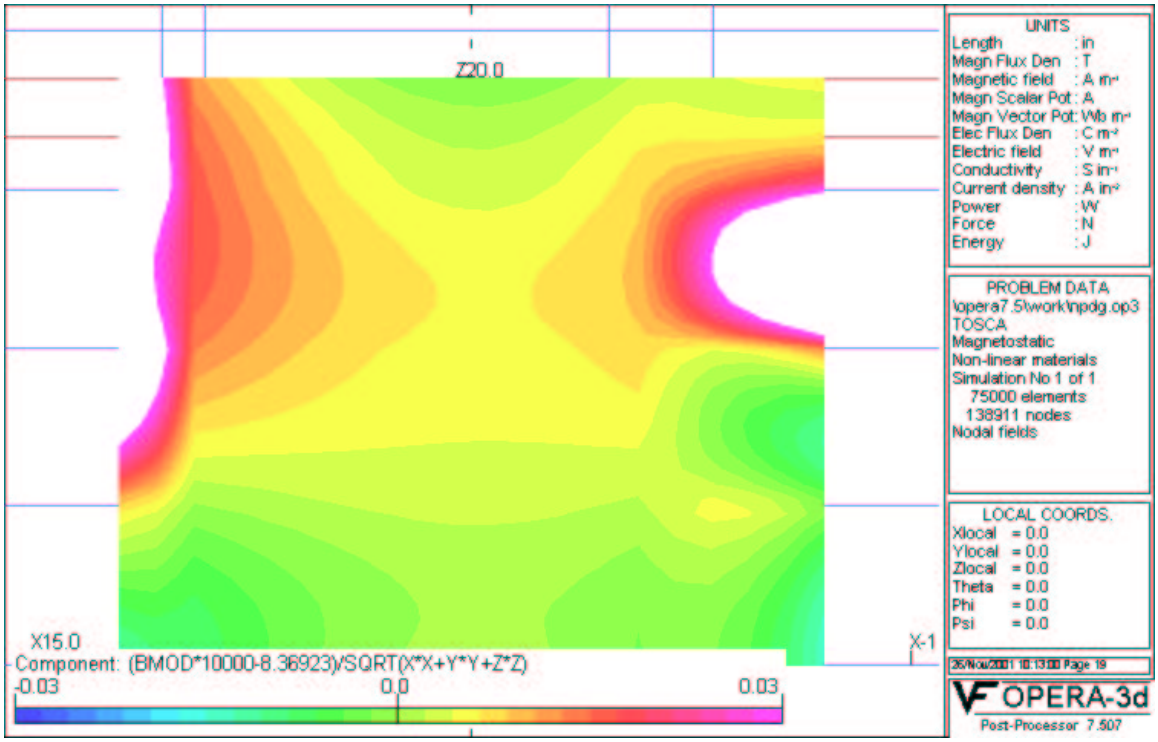


Gradient at Y=20 , 0<Z<20 , -12<X<12

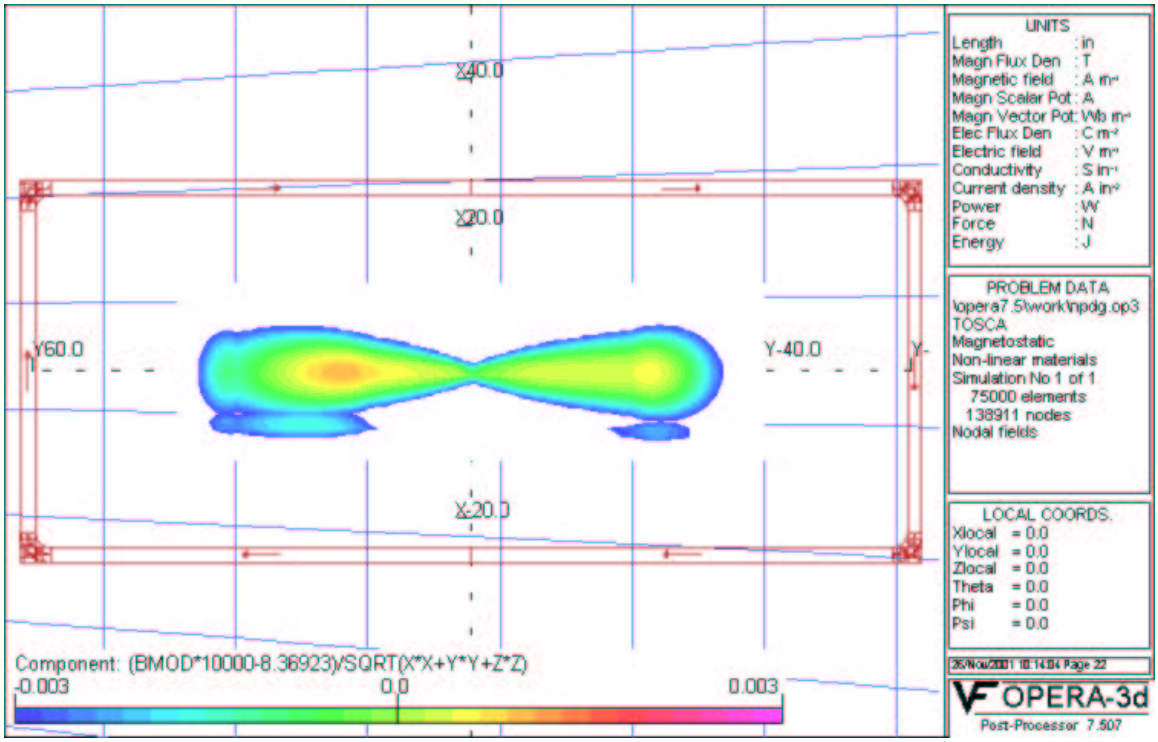
Grad = Bmod-B(000)/R



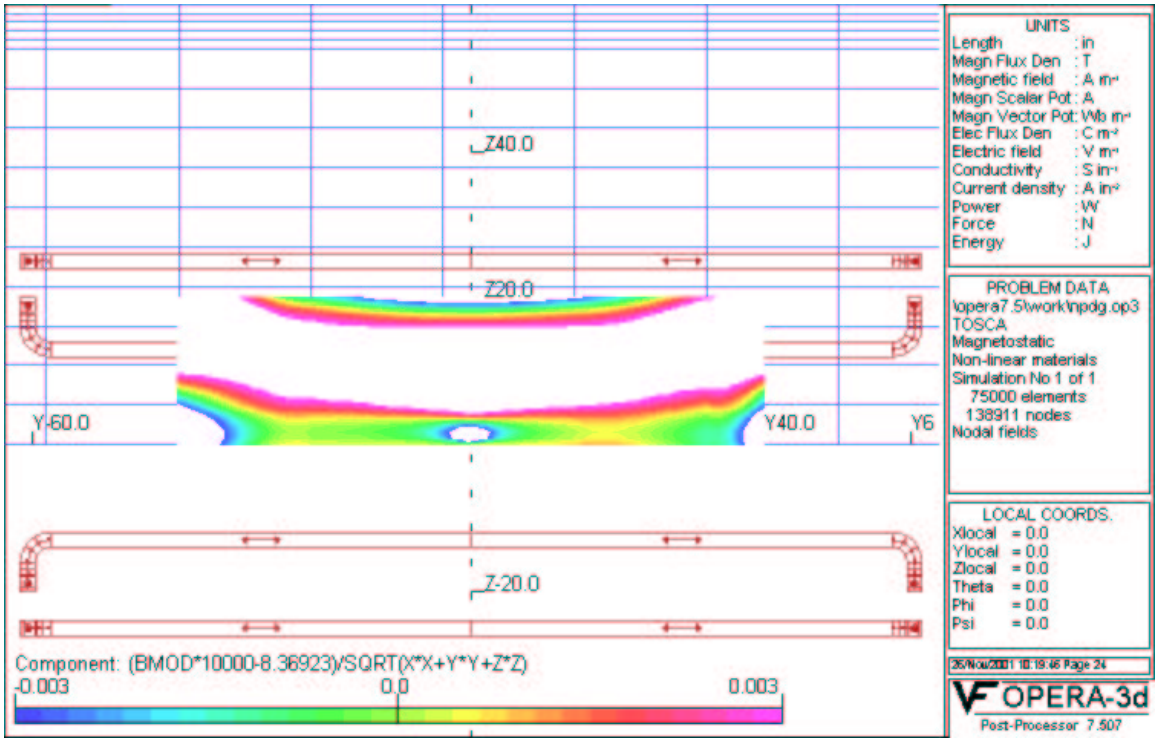
Gradient Y=0 , -12<X<12 ,0<Z<20



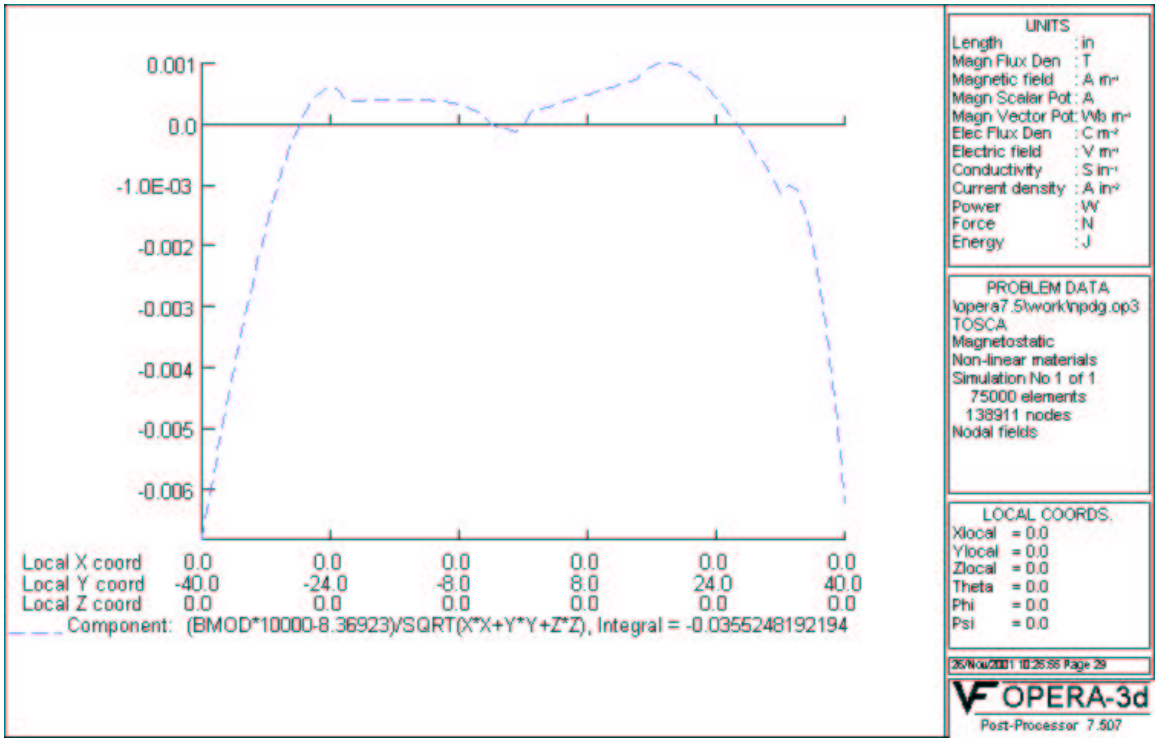
Gradient at Y=20 ,0<Z<20 , -12<X<12



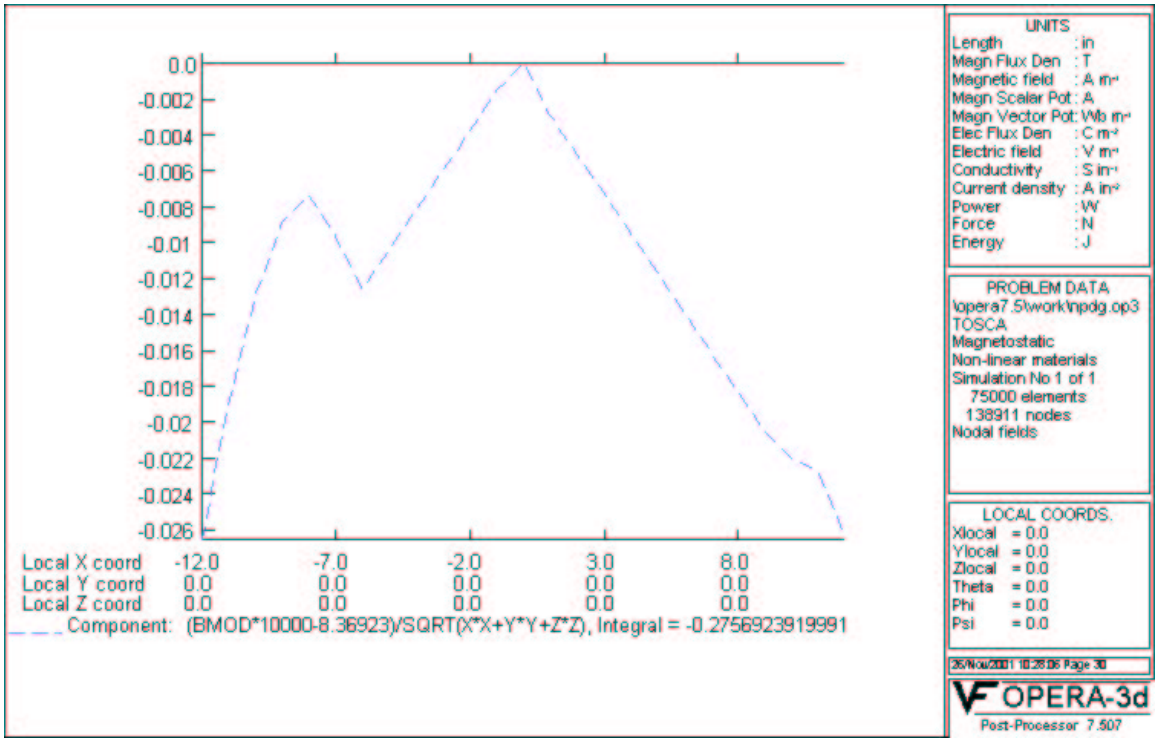
Gradient <0.003 Gauss/inch —40<Y<40 , -12<X<12 ,Z=0



Gradient < 0.003 gauss/inch , 0<Z<20 , -40<Y<40



Gradient <0.03 —40<Y<40



Gradient <0.03 —12<X<12 Z+Y+0